Claims:

1. A method for melting down metal-containing material, preferably fine-particulate metal-containing material, such as sponge iron, in a metallurgical melting furnace (1), wherein, in an interior space of the melting furnace (1), a metal melt (5) and a slag layer (6) floating on top of the metal melt (5) are maintained, the metal-containing material is added by means of a supply means dipping into the slag layer (6) and energy is added in the form of electric arcs (14), characterized in that the metal-containing material is directly charged into the central region (Z) of the melting furnace (1) by means of at least one charging tube (8) serving exclusively for conveying material via its charging tube opening (9), the electric arcs (14) are directed towards the metal melt (5) obliquely against the central region (Z) of the melting furnace (1) and the metal-containing material is melted in the slag layer (6) and a mixed process slag-metal melt is maintained in the region of the charging tube opening (9).

2. A method according to claim 1, characterized in that, in the close range of the opening of the charging tube (8), energy is supplied to the slag.

3. A method according to claim 1 or 2, characterized in that metal-containing material is charged in lumpy and/or fine-particulate form, preferably exclusively in fine-particulate form.

4. A method according to one or several of claims 1 to 3, characterized in that the metal-containing material is fed into the melting furnace (1) via the charging tube (8) in the hot and/or cold state, preferably with the sensible heat originating from a reduction process.

5. A method according to claim 4 characterized in that the metal-containing material is charged into the melting furnace (1) through the charging tube (8) at a temperature of between 500°C and 1000°C, preferably of between 600°C and 700°C.

6. A method according to one or several of claims 1 to 5, characterized in that the slag layer (6) is formed by foamed slag.

7. A method according claim 6, characterized in that the foamed slag is formed by means of gaseous oxygen, possibly under the supply of fine-grained carbon.

8. A method according to one or several of claims 1 to 7, characterized in that the metal-containing material is charged into the slag through the charging tube (8) exclusively by the aid of gravity.

9. A method according to one or several of claims 1 to 8, characterized in that the position of the charging tube (8) in the slag layer (6) is regulated or controlled by means of the charging rate.

10. A method according to one or several of claims 1 to 9, characterized in that the insertion depth of the charging tube (8) into the slag layer (6) is regulated or controlled by means of a voltage and/or current measuring on/in the charging tube (8) in combination with a distance measuring.

11. A method according to one or several of claims 1 to 10, characterized in that the melting furnace (1) is flushed preferably by the aid of a gas, hence initiating a bath turbulence and allowing a portion of the gas to rise in the charging tube (8).

12. A method according to one or several of claims 1 to 11, characterized in that the melting down of the metal-containing material is carried out continuously while maintaining one and the same level of the metal and optionally slag layers.

13. A method according to one or several of claims 1 to 12, characterized in that the melting down of the metal-containing material is carried out discontinuously, whereby the lower end (9) of the charging tube (8) is raised and lowered depending on the slag layer level.

14. A method according to one or several of claims 1 to 13, characterized in that the water vapour used or formed when cooling the melting furnace (1) and the off-gas devices (21 to 23) is used for producing a reducing gas in a reformer.

15. A method for melting down metal-containing material, preferably fine-particulate metal-containing material, such as sponge iron, in a metallurgical melting furnace (1), wherein, in an interior space of the melting furnace (1), a metal melt (5) and a slag layer (6) floating on top of the metal melt (5) are maintained, the metal-containing material is added by means of a supply means dipping into the slag layer (6) and energy is added in the form of electric arcs (14), characterized in that, exclusively by the aid of gravity, the metal-containing material is directly charged into the central region (Z) of the melting furnace (1) by means of a single central charging tube (8) serving exclusively for conveying material and having an inside diameter of at least

300 mm, preferably 600 mm, via its charging tube outlet (9), the electric arcs (14) are directed obliquely towards the metal melt (5) against the central region (Z) of the melting furnace (1), inclined at an angle of from 20° to 70° to the horizontal line, and the metal-containing material is melted in the slag layer (6) and a mixed process slag-metal melt is maintained in the region of the charging tube outlet (9).

16. A method for producing a metal-containing melt, preferably an iron melt, by continuously directly reducing a metal-containing ore and subsequently melting the thus produced metal-containing material, such as a sponge iron, in a melting furnace (1), characterized in that, after the completion of a melting furnace campaign, the fireproof worn out melting furnace (1) is exchanged for a totally or partially newly lined melting furnace (1) and metal-containing material produced during the time period necessary for the exchange is collected, that collected metal-containing material, together with freshly produced metal-containing material, is charged into the melting furnace (1) at an increased charging rate in a first stage of the furnace campaign of the exchanged melting furnace (1) until the working off of the collected amount of the metal-containing material and, after the working off of the collected metal-containing material, freshly produced metal-containing material is again melted down at a reduced normal charging rate.

17. A device for melting down metal-containing material, preferably fine-particulate metal-containing material, such as sponge iron, in a metallurgical melting furnace (1), whereby the melting furnace (1) is equipped with electrodes (13) for supplying energy to a metal bath covered by a slag layer (6) as well as with with an adjustable supply means dipping into the slag layer (6) for charging the melting furnace (1) with a metal-containing material, characterized in that the supply means has at least one charging tube (8) exclusively serving for conveying material, which charging tube expands into the central region (Z) of the melting furnace (1) and that, against a horizontal line, the electrodes (13) are directed obliquely towards the central region (Z) of the melting furnace (1).

18. A device according to claim 17, characterized in that the charging tube (8) is configured as a downpipe.

19. A device according to claim 17 or 18, characterized in that the lower end (9) of the charging tube (8) may be adjusted in height.

20. A device according to one or several of claims 17 to 19, characterized in that the charging tube (8) itself may be raised and lowered.

21. A device according to one or several of claims 17 to 20, characterized in that the charging tube (8) may be pivoted sideways.

22. A device according to one or several of claims 17 to 21, characterized in that the lower charging tube end (9) is positioned at least 10 mm below the slag layer surface or may be brought into such a position, respectively.

23. A device according to one or several of claims 17 to 22, characterized in that it possesses an adjusting and/or controlling means for adjusting the height of the charging tube (8).

24. A device according to claim 23, characterized in that the adjusting and/or controlling means has a device for measuring the charging rate of the metal-containing material, which device is coupled to a means (25) for rasing and lowering the charging tube (8).

25. A device according to claim 24 characterized in that the adjusting and/or controlling means has a device for measuring a voltage and/or a current at/in the charging tube (8), which device is coupled to a means (25) for rasing and lowering the charging tube (8).

26. A device according to one or several of claims 17 to 25, characterized in that the charging tube (8) has an inside diameter (12) of 200-1500 mm, preferably of 600-800 mm.

27. A device according to one or several of claims 17 to 26, characterized in that the charging tube (8) is manufactured from amorphous carbon.

28. A device according to one or several of claims 17 to 26, characterized in that the charging tube (8) is manufactured from graphite.

29. A device according to claim 27 and/or 28, characterized in that, on the outside, the charging tube (8) is coated with Al_2O_3.

30. A device according to claim 27 and/or 28, characterized in that, on the outside, the charging tube (8) is furnished with a water spray cooling system.

31. A device according to one or several of claims 17 to 26, characterized in that the charging tube (8) is manufactured from a fireproof material.

32. A device according to one or several of claims 17 to 26, characterized in that the charging tube (8) is manufactured from tubes cooled by means of water or water vapour.

33. A device according to one or several of claims 17 to 31, characterized in that the charging tube (8) is manufactured from several shots (29), which are screwed together and exchangeable.

34. A device according to one or several of claims 17 to 33, characterized in that a gas flushing stone (16) is integrated into the melting furnace (1), which gas flushing stone causes gas bubbles to rise into the charging tube (8).

35. A device according to one or several of claims 17 to 34, characterized in that the electrodes (13) are arranged in close vicinity to the charging tube (8) or to the charging tubes (8), respectively.

36. A device according to one or several of claims 17 to 35, characterized in that, in their normal position with reference to the bath level, the electrodes (13) are directed towards a partial circle located approximately in the centre between the outer surface of the charging tube (8) and the inner outline of the hearth brick lining.

37. A device according to one or several of claims 17 to 36, characterized in that the electrodes (13) are inclined at an angle of from 20° to 70° to the horizontal line.

38. A device according to one or several of claims 17 to 37, characterized in that, seen in the ground plan, the electrodes (13) are radially directed towards the centre of the melting furnace (1) and hence the charging tube (8).

39. A device according to one or several of claims 17 to 37, characterized in that, seen in the ground plan, the electrodes (13) are tangentially directed towards various partial circles.

40. A device according to one or several of claims 17 to 39, characterized in that, by changing the angle of inclination of the electrodes (13) and the electrode stroke with regard to their distance from the charging tube (8), the tips of the electrodes are variably adjustable.

41. A device according to one or several of claims 17 to 40, characterized in that it is arranged in the immediate vicinity of a direct reduction plant.

42. A device according to one or several of claims 17 to 41, characterized in that a cooling system for the suction device (21 to 23) and for the melting furnace (1) is coupled to a plant for the production of a reducing gas, such as a reformer, und preferably to a reduction plant for the production of the fine-particulate material to be melted down.

43. A device according to one or several of claims 17 to 42, characterized in that the charging tube (8) is pivotable towards a charging tube maintenance and/or changing station (27).

44. A device according to one or several of claims 17 to 43, characterized in that a hot gas duct (21) cooled by means of water or water vapour is foreseen, which hot gas duct runs into the interior space (11) of the melting furnace (1) and via which dust-loaded off-gases are dischargable from the interior space (11) of the melting furnace (1).

45. A device according to one or several of claims 17 to 44, characterized in that a secondary suction tube (22) for sucking off off-gases emerging from the charging tube (8) as well as from the charging chute (17) is provided.

46. A device according to claim 44 and 45, characterized in that a discharge tube (23) cooled by means of water or water vapour, into which the hot gas duct (21) and the secondary suction tube (22) run, and an off-gas purification plant, into which the discharge tube (23) runs, are provided.

47. A device according to plant 46, characterized in that the off-gas purification means is provided with a conveying device by the aid of which dust separated in the off-gas purification means may be taken to a direct reduction plant.

48. A device for melting down metal-containing material, preferably fine-particulate metal-containing material, such as sponge iron, in a metallurgical melting furnace (1), wherein the melting furnace (1) is furnished with electrodes (13) for supplying energy to a metal bath covered by a slag layer (6) as well as with an adjustable supply means dipping into the slag layer (6) for supplying the melting furnace (1) with a metal-containing material, characterized in that the supply means has a single centrally-arranged charging tube (8) serving exclusively for conveying material and being configured as a downpipe, which charging tube has an inside diameter of at least 300 mm, preferably at least 600 mm, and expands into the central region (Z) of the melting furnace (1) and that the electrodes (13) are directed obliquely towards the central

region (Z) of the melting furnace (1), inclined at an angle of from 20° to 70° to the horizontal line.